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the Arthropoda, commencing with the Crustacea for the third volume, of which only the general matter and the Cirripedia and Copepoda are as yet published, and three or four parts of a sixth volume for birds have been issued by Selenka, treating the anatomical and other matters in great detail. Another general work of merit, although on a smaller scale, has been proceeding as slowly. Of Carus and Gerstaecker's "Handbuch der Zoologie," the second volume, containing the Arthropoda, Malacozoa, and lower animals, had been already published in 1861, and to this was added in 1868 the first half of the Vertebrata for the first volume, with a promise that the remainder should appear in the autumn, but which promise has not yet been fulfilled. Among the other recently published systematic zoological handbooks of which I have memoranda as published in various Continental states, the most important are said to be Harting's, published at Kiel, in the Netherlands, of which up to 1870 only three volumes had appeared, containing the Crustacea, Vermes, Malacozoa, and lower animals; A. E. Holmgren's "Swedish Handbook;" Zoology, of which Mammalia were published in 1865, and Birds in 1868 to 1871; and Claus's "Grundzüge," and Troschel's "Handbook" (7th edition) for University Teaching in Germany.—BENTHAM, Annual Address to Linnean Society, published in *Nature*.

SPONTANEOUS DOUBLE FLOWER OF NYMPHÆA TUBEROSA.—Dr. E. M. Hale of Chicago sends a flower of the Western White Water-Lily, having apparently only the ordinary number of petals, but no stamens and pistil whatever. If cared for it is likely that the root would soon send up flowers with an increased number of petals, like a full double rose. Unfortunately this species lacks the perfume of *N. odorata*.



ZOOLOGY.

ORIGIN OF SPECIES.—Professor Hyatt alluded at a late meeting of the Boston Society of Natural History, to the color of the common Unios and Anodons as probably protective, and the well-known case of the Melaniæ of the Western rivers, which are hardly distinguishable to the unpractised eye, and to the peculiar and marked variations of the siluroid fishes of the same region, which

agree very closely with the ground on which they live. Professor Hyatt added that he by no means desired to indorse the Darwinian doctrine of natural selection. A belief in evolution and the derivation of all higher forms from lower and simple organisms, perhaps from inorganic matter itself, by means of secondary natural forces, is perfectly consistent with opposition to the Darwinian theory. According to this theory, new characteristics and therefore new kinds and species of animals arise by the survival of the fittest; as in a recent instance cited by the AMERICAN NATURALIST, where a new race of deer is supposed to be in course of formation in the Southern Adirondacks. In this case certain full-grown bucks about thirteen years ago were produced with short, stabbing horns like the young deer. These were thus enabled to drive away the branching-horned forms during the rutting season, and to leave a larger number of descendants. These and their descendants, in turn enjoying similar advantages, are, it is stated, gradually supplanting the branching-horned deer in this locality. The facts have been disputed, and need the confirmation of further observation and experience; but they form, perhaps, one of the best illustrations of the theory of natural selection ever recorded. Assuming, however, that it is true, and that a new species of deer is now being evolved in this region, what does natural selection really account for? It must account for the preservation and perpetuation of the branching-horned variety, as well as the rise of the straight-horned.

The Anoplotherium of the Eocene, which has always been considered by Owen and others as the probable ancestor of the *Cervidæ*, had no horns, even in the adults. The young deer, when it is born, has none and the process by which they are acquired takes place subsequently. The general characteristics of the deer antlers of the Miocene and Pliocene were simple, with only one tine or prong like those of the young deer, and the palmate and extensively pronged were not brought out fully until the post-pliocene. To-day a decline seems to be taking place, since neither the reindeer, nor the moose equals the extinct Irish elk in the complexity and rise of its horns.

If Darwinism can account for the propagation of this new race, by the advantage which the short stabbing horns gives to the bucks, how could any branching antlers ever have arisen from the Miocene deer? In accordance with the theory of natural or

sexual selection the horns should have become longer and sharper, and have dropped their tynes, thus making them better weapons. The reverse has certainly occurred, and antlers developed of extraordinary size, cumbersome and useless in comparison with the short dagger-like horns of the Miocene deer. According to Darwin's latest modification, in his *Descent of Man*, the increase in the size would be accounted for by sexual selection; namely that the females would select the males having the largest horns, and thus the size of the horns would be increased by successive generations. If this be the explanation, how shall we account for the rise of the short-horned variety at the present time? Darwin quotes this instance as an example of natural and sexual selection, in his last book, "*The Descent of Man*," vol. ii. p. 243, Am. ed.

Presuming, however, that natural selection does account for the evolution of the branching horns, and also for the preservation and gradual increase in numbers of the present spike-horned buck, as it may be fairly assumed in many instances to act in the preservation and perpetuation of many characteristics, it neither does nor can account for the first appearance of horns, or the first appearance of a full-grown buck having the spike-horns. This inadequacy of the theory of natural selection to show us how characteristics arise has been repeatedly insisted upon by several authors. Professor Cope and himself, in two widely separated departments, among the Reptiles on the one hand, and the Mollusks on the other, have repeatedly pointed out the mode in which characteristics, races, species and genera have arisen. Several writers on the continent, and Mr. St. George Mivart, in his "*Genesis of Species*," have lately taken similar views. The latter continually alludes to the sudden rise of species or races, and gives an instance of the sudden appearance of the black-shouldered peacock. This variety, previously known in India as a separate species, speedily increased to the extinction of the original form. Here, as St. George Mivart points out, under different geographical influences, the same species has suddenly arisen in India and in England. Here are no slow changes similar to those perpetually cited by Darwin and Wallace, no gradual fading of one species into another, but a sudden evolution of a new distinct form.

Mivart, too, states that the view here advocated regards the whole organic world as arising and going forward in one harmonious development, similar to that which displays itself in the growth

and action of each separate individual organism, This apparently is the keynote of his book. This was the view advocated by the speaker, some four years previous in the Memoirs of the Society, in a paper written to establish the fact that all characteristics had arisen suddenly among the *ammonites* and *nautili* of past geological epochs. This paper was a short, preliminary statement of facts observed, and it did not excite his surprise that Mivart had overlooked it. He could not however help wondering at the absolute silence preserved with relation to the essay of Professor Cope of Philadelphia. This had been issued at about the same time and independently, but advocated nearly the same views as regarded the sudden production of characteristics among the Reptiles, and must have been well known to Professor Huxley, with whom Mivart seems to have taken council. This omission is by no means creditable to the author of a work written to refute such books as Darwin is in the habit of producing, and contrasts unfavorably with that writer's evident acquaintance with the essay alluded to above. This is shown most by the manner in which he is obliged to rest the proof of his assertion, that species arise suddenly, upon a number of isolated facts; whereas either Professor Cope's paper, or the speaker's, especially the former, would have furnished him with a number of reliable and serially connected illustrations of the quick evolution of species.

PARASITES. — Prof. Van Beneden, as we have before noticed, has distinguished true parasites, which live *on* their host, from commensals, those which live merely *with* their host, the thieving impostor from the respectable lodger. In an admirable work on the "Fishes of the coasts of Belgium, their Commensals and Parasites" published by the Academy of Sciences of Brussels, he now further classifies parasitic organisms. The commensals are either 1, *Oikosites*, fixed; or 2, *Coinosites*, free. The *Oikosites* fish for their own living, and merely ask a free passage from their hosts. They are either fixed in perpetuity, as *Coronula*, *Cochliolepis*, *Modiolaria*, *Mnestra*, and *Loxosoma*, temporarily as the *Remora*, *Anilocra*, *Praniza*, or only in the young state, *e. g.*, *Caligus* and *Anodon*. The *Coinosites*, on the other hand, never give up their liberty; they occasionally leave their host, and between *Coinosite* and host there is often an exchange of good offices, one furnishing a solid house or a strong claw, the other a sharp eye, and they

may share their prey in common. The digestive canal is occupied by the following Coinosites :—Fierasper, Stegophyle, Stylifer, Phronimus, Hyperia, the mantle by Pinnotheres and Pagurus, the exterior by Myzostoma, Cyamus, Pycnogonon, Caprella and Chætogaster.

The true parasites cannot live without assistance; they are divisible into several categories. Some, such as the leech, fleas, and some dipterous insects, suck the blood of their victim, and then quit him to take their after-dinner nap in the open air; others, such as the ichneumon flies, do not quit their host till they have become adult, and have in the process exhausted the last drop of blood of their unfortunate prey. The greater number lead a free life when young and merely attach themselves to a host at the time of reproduction, such are the Bopyrian and Lernæan Crustacea. There is a further very interesting group, who enter a host while yet young, simply in order that they may get carried by its means into a second host, where they will ripen their eggs. Often whilst waiting in their first host (sometimes vainly waiting, no doubt) for him to be devoured by their second and ultimate victim they reproduce *agamically*. Such parasites are the Flukes and many Tapeworms. These divisions are thus tabularly set forth :—

Parasites free.			
during all their life.		during a part of their life they pass through	
		a single host.	several hosts whilst immature.
Leeches.		whilst im-	when ma-
Fleas and Flies.		mature.	ture.
<i>Caligus</i> .		Ichneumons.	Bopyrians.
		<i>Mermis</i> .	Lernæans.
			Distomata.
			Cestoids.

The parasites of the first category which are free during all their life, Professor Van Beneden calls Phagositæ, and compares them to the *habitués* of a hotel who avail themselves of the *table d'hôte*, but do not have a bedroom in the building. The other parasites which have both board and lodging are divisible into three principal categories. 1st. Xenosites—who are pilgrims in transit—voyaging with a distinct but distant object in view. They are always agamic, lodge in such closed organs as the brain, muscles, and serous membranes, and wait patiently till they get into the stomach of the animal where they are destined to breed.

The stomachs and appendages of fishes swarm with parasites, and those which have the largest *clientèle* are by no means the least healthy or thinnest. Often one fish, having swallowed another, is swallowed by a third, and thus Xenosites find themselves set free in the wrong fish's stomach, for the stomach acts like a filter, straining out and retaining the parasites, while the flesh is digested. Such erring Xenosites merely wait and may often pass through several "hotels" before they reach their destination. 2nd, Nostosites—those who have reached their destination, and now can abandon themselves to generation. Whilst the Xenosite was obliged to put up often with an uncomfortable cramped lodging, biding his time, the Nostosite occupies the most eligible organs for parasitism—in fact, the most vast and commodious chambers of the hotel. The 3rd division are the Pilgrims, who have lost their way hopelessly, and are in worse plight than even in Giant Despair's castle. Such are the agamic worms which are found often in the Plagiostomous fishes, and who ought to have got into some Teleostean fish, there to fructify—a happy fate forever lost to them when by unlucky chance the host in whom they trusted was swallowed by a remorseless shark. They never quit this retreat.

Prof. Van Beneden gives directions for searching an animal for its parasites, and justly claims a high interest for the study of the fauna of individual species, and urges such neat and sharply-limited zoological inquiries on those who do not feel prepared to study the fauna of a geographical region—to the philosophy of which, indeed, the study of parasite-faunæ may furnish important suggestions. Ninety-three species of fish, with their parasites and commensals, are cited in this work from the author's own observation. Eight plates illustrate it.—E. R. L., in *Nature*.

THE THEORY OF NATURAL SELECTION.—In "Nature" for Nov. 10, Mr. A. W. Bennett discusses the theory of natural selection, which he holds to be inadequate to account for the origin of species. Taking as his starting point the two principles laid down by Mr. Darwin himself, that natural selection always operates through the perpetuation of exceedingly small changes, and that every change thus perpetuated by natural selection must be directly beneficial to the individual, he applies these principles to the phenomena of Mimicry, as illustrated in Mr. Wallace's "Contributions to the The-

ory of Natural Selection." Mr. Bennett maintains that in those cases where a butterfly mimics exactly the external facies of a species belonging to a different tribe, the amount of change in the direction of the species ultimately mimicked which can have been established in a single generation, is so small as to be absolutely useless to the individual, and hence, according to one of the cardinal principles of the Darwinian hypothesis, cannot have been brought about by natural selection. He then traces a connection, which he believes to have been overlooked hitherto, between the development of the power of mimicry or protective resemblance, and that of instinct, in the various classes of the animal kingdom, and argues that their parallelism must result from some connection between these phenomena. In conclusion, he contends that Mr. Wallace's abandonment of the theory of natural selection, in accounting for the development of man and of the various races of mankind, is inconsistent and illogical, and that whatever "intelligence," as Mr. Wallace expresses it, has been operative in the origination of man, the same principle must have been at work also in the various lower races of animals. In reply, Mr. Wallace and other naturalists maintain that the steps necessary to transform a butterfly from its normal facies to one imitating exactly an entirely different butterfly of another genus, need not be so numerous as is generally supposed; and that each step may be proved to be directly beneficial to the individual; and hence natural selection is amply sufficient to account for the whole phenomenon. In a subsequent number (Dec. 22) Mr. A. Murray attributes the phenomenon of mimicry to an entirely different cause, that of hybridization, drawing a parallel between the hybridization which he assumes in Lepidoptera and that which is known to take place in plants. This theory is strongly opposed by other entomologists, mainly on the ground that it is unsupported by observed facts, and that from the crossing of plants belonging to different species of the same genus, no assumption can be made that butterflies belonging to entirely different genera and even orders can possibly hybridize.—*The Academy*.

MODE OF LIFE OF THE SUCKING-FISH AND PILOT-FISH.—Professor Van Beneden has ascertained the nature of the food of these two forms of fishes. The sucking-fish has sometimes been supposed to derive its nourishment from the sharks, to which it

attaches itself by the curious apparatus on the crown of its head. M. Van Beneden finds that the common sucking-fish (*Echeneis remora*) feeds upon small fishes. From an examination of the contents of the stomach in several examples of the pilot-fish (*Naukrates*) — it would appear that this fish is omnivorous. — the food consisted of portions of fishes, crustacea, fucoid plants, and, in one instance, parings of potatoes. These observations have been communicated to the Royal Academy of Belgium. — *The Academy*.

AFRICAN ANT CATS. — The plains of South Africa are characterized by numerous animals generally known to the Boers as “mierkatjes,” or ant cats. Most of these are *Viverra*, *Herpestes*, *Luricates*, etc., and all have nearly similar habits. Early in the morning these pretty animals may be seen in numerous groups sitting upon their hind legs warming themselves in the sun, and when startled, scampering away to their holes, with their tails cocked high up in the air. They all feed on mice, small reptiles, grasshoppers and locusts. They likewise greedily devour birds’ eggs. They are more or less colored like the Karoo soil. Mr. Weale also gives in the same letter to “Nature,” an interesting account of the protective resemblances of animals in that part of the world.

AMERICAN BIRDS IN GREAT BRITAIN. — Mr. H. E. Dresser exhibited to the Zoological Society a specimen of the American Yellow-billed Cuckoo (*Coccyzus Americanus*) recently killed in England, and Sir Victor Brooke a specimen of the Esquimaux Curlew (*Numenius borealis*) lately killed in Ireland.

WILD RABBITS. — Seventy years ago some domestic rabbits were introduced upon Sable Island, a small, sandy islet lying about a hundred miles off the Nova Scotia coast, and being left alone and not crossed in breeding, they have entered their feral state in liveries of beautiful silver grey, with white collars, intimating some remote affinities with bygone races.

TWO ORNITHOLOGICAL ITEMS. — On the twelfth of last January I shot here a female Evening Grosbeak, out of a flock of about a dozen individuals which was observed several times at Ann Arbor. On the fifteenth of April following, I found the young of the Shore Lark already fledged. — B. WALKER, *Detroit, Mich.*

[Although the *Hesperiphona* is usually quoted as a western bird,

it ordinarily reaches eastward to the Lake Superior region. We have various accounts of its occurrence in Ohio, Illinois, etc., and even in Canada (McIlwraith). In the West, the *Eremophila* breeds anywhere on the plains suited to its wants, much further south than on the Atlantic border; thus we have found it in New Mexico, in June. But the fact that it nests and lays in March, in Michigan, may not be generally known.—E. C.

THE NOTES OF THE WHIPPOORWILL.—Several pairs of Whippoorwills nest near my house. One male bird sits night and morning on the roof of my front piazza, and sings there by the half hour, or even by the hour together. From windows opening upon that roof I observe him at the distance of ten, eight, often of only six feet. The same bird, or his ancestor, has occupied the same post in summer, morning and evening, for several years.

I am not aware that any writer ascribes to the Whippoorwill more than a single note. Wilson, quoted by Samuels, indeed says "When near, you often hear an introductory cluck between the notes." Besides this "cluck" which can scarcely be called a note, the Whippoorwill has *three* distinct notes. There is the common, well known note of Whip-poor-will; heard close by, this note is more nearly "Quipo-o-Will,"—the first and last syllables being very quickly and sharply uttered, the last almost like the cracking of a whip; while the second syllable is somewhat prolonged. Accompanying or preceding the first syllable is a sound like the striking of the bird's beak upon a board. The negroes affirm that the noise is so made; but after pretty careful observation, I think they are mistaken. How the sound is made I am not prepared to assert; possibly it is by the snapping of the beak. This is, I suppose, the "cluck" of Wilson and Samuels. Then the Whippoorwill has a note like "Whit, whit, whit"—very soft and musical—often uttered while the bird is upon the wing, yet often uttered also while at rest. It is soft and sweet as possible. Besides these, the bird has a low, harsh, discordant note like "Gor-gor-gor," or occasionally, "Go-ror, go-ror, go-ror." I have never heard this except when another bird was close by. I take it to be a scolding note, or note of defiance when another male bird comes near. While uttering this last note the bird stands erect, with its head raised as high as possible, and its feathers ruffled. While singing "Whip-poor-will" it always lies with its breast flat

to the roof, or fence or whatever it is sitting on.—FAIRFAX, Virginia, July 3d, 1871.

THE BILLFISH IN FRESH WATER.—Mr. G. Brown Goode of the Museum of the Wesleyan University, informs us that a fine specimen of *Belone truncata*, “Green bone,” “Billfish” or “Salt water Gar,” measuring twenty inches in length, was taken, in June last, in the Connecticut River about thirty miles up, and that he has heard of several other specimens having been taken in the fresh waters of the river, though all the authorities he has been able to consult, give the habits of the species as strictly marine.

There are about fifty species of the genus *Belone* described, and though they are essentially marine fishes of the tropical and temperate regions, yet many of the species are known to live, in great part, at the mouths of rivers, and to ascend to, and thrive in, the fresh waters. It is probably a characteristic common to the whole genus and to the allied genus *Hemiramphus*. Many fishes, generally classed as marine, enter the rivers in pursuit of their food, or for the purpose of spawning, and our local authorities do not always mention such facts in their works, being often more taken up with describing and identifying the species, than in giving accounts of the habits of the fishes that come under their observation.—EDS.

NEW ENGLAND ASCIDIANS.—Prof. Verrill is publishing a series of illustrated articles on our ascidians in the “American Journal of Arts and Sciences.” The number for June contains descriptions of some of our compound ascidians which have heretofore been sadly neglected. Several new genera and new species are described. He finds that the young of *Lissoclinum aureum* from Eastport, Maine, contained “tadpole-shaped embryos in an advanced stage of development,” while in another species (*L. tenerum* n. sp.) from Newfoundland, the eggs were few and relatively very large. “The development of such eggs is *direct*, without passing through a tadpole-shaped larval state.” This is remarkable, though paralleled in the crustacea, where, for instance the craw fish and several other crabs undergo no metamorphosis while the majority do pass through transformations. In a note Verrill says “with alcoholic specimens it is not possible to trace completely the early stages of this development, or to be perfectly certain that these egg-like bodies are genuine eggs, al-

though some of them appear to contain, at first, a germinal vesicle." The subject is one of great interest, in connection with the supposed kinship of ascidians with vertebrates, if there is anything in the fancied resemblance, which is much doubted by the most cautious and learned comparative anatomists.

FIGHTING BEETLES.—Mr. Lewis exhibited to the Entomological Society of London, an earthen jar, like an ordinary tobacco jar, of Chinese manufacture. It had an enormously thick porous bottom, and it was stated that the inhabitants of Pekin use these jars for the purpose of confining large beetles, which they keep for fighting. The beetles are allowed no food but water, and become extremely ferocious. Prof. Westwood reminded the meeting that the Chinese were already known to keep Mantides for fighting purposes.

IMMATURE SEXUALITY IN INSECTS.—Mr. Lowne read a paper on this subject before the London Entomological Society. The author thought that species sometimes originated from the maturity of the sexual organization before the acquirement of adult characters; a conclusion he had arrived at in consequence of the early development of the organs in the embryo and larva. He further stated, that, in his opinion, the larval and pupal conditions were probably acquired and not direct stages of development.

THE EMBRYOLOGY OF SCORPIONS.—Dr. Elias Metschnikoff has recently published in Siebold and Kölliker's Journal, an elaborate account, highly illustrated, of the embryology of the *Scorpio Italicus* and of a species from Tyrol. The embryology of insects and crustacea as pursued at the present day by zoölogists, who are directing especial attention to the provisional membranes of the egg and embryo, depends almost as much on the skilful use of chemicals as the microscope itself. The author says "the methods which I employ in these researches are not complicated. I study the eggs removed from the ovarian tubes; or, place the living embryo in a drop of a weak solution of salt (salzlösung); or I at first submit them to the influence of solutions of chromic acid of different strengths, and then examine them either with a simple or compound microscope. Out of embryos hardened in this way I can make sections. Much of the time I have to work with dissecting needles, while the embryos or portions of them treated in this

way, and in an equal mixture of fresh and salt water, afford very good objects for study."

The embryology of scorpions was sketched out in a general way by the distinguished German embryologist Rathke. Metschnikoff extends these researches very greatly, and considers as the most important results of his studies the discovery that "in the embryo of the scorpions three embryonal membranes are developed, which, in many respects are very strikingly similar to the Remackian embryonal membranes of the vertebrates."

A SOUTH AMERICAN BIRD IN THE UNITED STATES.—The specimen of *Erismatura Dominica*, the gift of Mr. Thure Kumlien of Bussyville, Wisconsin, having been presented, Dr. Brewer called the attention of the Boston Society of Natural History to the interest attaching to this specimen. It is a South American bird, and this specimen is the second obtained in the United States. The first, a male, was shot at Lake Champlain, and was presented to the society by Dr. Samuel Cabot. This specimen, the second ever obtained north of Mexico, was shot at Rock River, Bussyville, Wisconsin, November, 1870. It is a female; its total length is fourteen inches; alar extent twenty and one-half inches. The tail consists of twenty very narrow feathers, of which the first is the shortest. The tail extends only three inches beyond the folded wings. Bill one and one-sixteenth inches from base to tip above; one and nine-sixteenths depth at base, and three-fourths of an inch wide. Wing with second primary longest; third and first, even. Iris, brown.

SHAD EGGS.—When shad eggs are first impregnated they are very small, but after a short time they swell greatly *and the water in the impregnating pan becomes about 10° colder*.—A. S. COLLINS.

[Can any one give us an explanation of this *fact*?—Eds.]

DISCOVERY OF THE ANIMAL OF THE SPONGIADÆ CONFIRMED.—Just a line to tell you what you will be glad to learn, viz., that I have confirmed all that Prof. James Clark of Boston, [now of the Kentucky University] has stated about the sponge-cell, and much more too.

It is, after all, only what was published and illustrated in the "Annals" in 1857. Indeed, I am astonished now at the accuracy and detail of that paper ("Ultimate Structure of Spongilla," etc.), now *all* confirmed by an examination of a *marine* calcareous

sponge. I have not only fed the sponge with indigo, and examined all at the moment, but the sponge so fed was put into spirit directly afterward, and *now* shows all the cells (monociliated) with the *cilium attached and the indigo still in the cells*.

This, I think, will break down Hæckel's hypothesis, which is as imaginative and incorrect as it is beautiful.

His "Magosphæra," too, is figured in the "Annals" (1856), and described *in extenso* as the amœboid cell which inhabits the mucus of the cells or internodes of the Bombay great *Nitella*.

But there are no people in England, if on the Continent, who seem to be able to show this, if even they be cognizant of it.

Ex oriente lux used to be the old phrase; the light is now being *reflected* back from America. It is from there that we must expect novelties now.—H. J. CARTER, in *Annals and Mag. N. History*.



GEOLOGY.

ROCKS POLISHED BY SAND.—Dr. Kneeland, at a meeting of the Boston Society of Natural History, exhibited several specimens of glass, marble and hard stones engraved, carved and grooved by the action of sand driven by a blast of air or steam. The surface being covered with perforated paper or a stencil plate, the parts exposed by the perforations are cut rapidly and accurately, while the covered parts are untouched; protected, it is supposed, by the elasticity of the paper or metal. He drew attention to this industrial process as illustrating the advantage of diffusing, as a common branch of knowledge, information on the forces of nature, and, in this instance, on dynamical geology. This process which promises to revolutionize one of the most extensive of the industrial arts, is simply carrying out what natural forces have been doing to the surface rocks of our continent for ages. Sands carried by strong and steady winds, passing over rocks, often wear them smooth, or cover them with grooves and scratches, as noticed and figured by Mr. Blake in the granite rocks at San Bernardino Pass, California. (See Pacific Railroad Reports, Vol. V. pp. 92 and 231.) Quartz rocks were there found polished, the softer feldspar being cut away; where the latter had been protected by garnets, projections were left, tipped with the hard garnets, pointing like fingers in the direction of the wind.